



EFFECT OF INCOME DIVERSIFICATION ON POVERTY STATUS AMONG RURAL FARMING HOUSEHOLDS IN OYO STATE, NIGERIA

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ABSTRACT

The study examined effect of income diversification on poverty status among rural farming households in Oyo State, Nigeria. Primary data was used with the aid of a well structured questionnaire and interview guide. The data collection process comprised of socioeconomic variables, input variables, poverty variables and income diversification variables among others in the study area. A multistage sampling procedure was employed in the selection of 180 respondents used for the survey. Socio-economic characteristics, diversification and poverty attributes were analyzed using the parametric and non-parametric tools such as Descriptive Statistics (DS), Herfindahl Index (HI) and Probit Model among others. The results for the socioeconomic attributes of the respondents showed their mean age (62.5 years), farming experience (42.4 years), monthly income (N76, 438.45k) and the household size (6 members). The results also showed that respondents that fell within the non-poverty (48.9%) and poverty group (51.1%), while those that diversified (77.8%) and non-diversified (22.2%) dichotomized poverty and diversification groups. Diversification was strongly determined by years of education (0.0012; $P < 0.10$) and farm size (0.0108; $P < 0.01$) while poverty was significantly influenced by gender (0.8393; $P < 0.05$) and household size (0.5584; $P < 0.01$). The Chi square result for the hypothesis tested revealed that marital status, education, farm size and household size influenced the diversification index of the respondents which is significant ($P < 0.01$). Rural farmers should be encouraged to diversify their income sources to compensate for the off-season in the year when there is partial or zero production for household's income sustainability and welfare. The classification of rural farming household result revealed that 77.78% of the farming household in the study area had diversified income sources as shown by $IHHD < 1$.

Keywords: Diversification, Income, Poverty and Rural Households

INTRODUCTION

Poverty is simply defined as lack of job, persistent hunger, poor health, low education, low self-esteem, lack of adequate housing, lack of land, low economic status, and inability to clothe oneself and family (Adigun *et al.*, 2011). According to Lawal *et al.*, (2011), poverty creates frustration, loss of prospects, hope and value for life, loss of meaning for life and purpose of living. Poverty also creates disillusionment about morality as it makes people compromise on moral values or abandon moral values completely. Okafor, (2004) affirmed that the success or failure of any government is measured by the degree of attainment of human development or the level of poverty prevalent among the people (British Council, 2012). Nigeria is a country with the largest population on the African continent with 162.5 million people, and it is among the thirty most unequal countries in the world with respect to income distribution, where the poorest half of the population holds only 10% of national income (British Council, 2012). More worrisome is that 54% of the Nigerians live in poverty and the proportion has doubled since 1980 when about 28% were classified as poor. Human Development Indicators (HDIs) are also worse than those of comparable lower middle-income countries revealing that 42% of the Nigerian children are malnourished of which the majority are found in the rural areas. In the rural communities, farming is their major source



of livelihood and it is characterized by low access to productive resources and education, which can ostensibly assist in training them to jump out of the shackle of poverty is either unavailable or below standard (Idowu *et al.*, 2011; Ajakaiye and Adeyeye, 2001).

Rural Nigeria is characterized by agrarian livelihood as well as certain other primary production activities. Studies have shown that agricultural-based livelihood in rural Nigeria has a higher level of poverty than other occupational groups. Rural agriculture is subjected to local variations in weather conditions, and thus expected variations in income levels and thus access to food (Omonona, 2009). In the peak of dry season, farmers are almost idle due to the cease of rainfall in the later part of the year hence the suspension of farm work rainy season in the following year which leads to a break or reduction in the income of farmers (Babatunde and Qaim, 2010). In order to sustain the income flow and pave the way for the welfare of the households, there is need to diversify the sources of income by the farmers (Oluwatayo, 2009). The break in the income flow experience by the farming households in the off-season in the year is characterized by declining and irregular income, low rate of capital accumulation with agricultural output trending downward due to the rapidly changing climatic conditions. Meanwhile, it has been established that in many rural parts of the country, agriculture alone does not provide sufficient livelihood opportunities and based on this, income diversification is looked at as alternative means of survival in the year owing to the fact that it offers the rural farming households the options for coping with the seasonal crisis (Lanjouw, 1999).

Despite the fact that rural areas are agrarian in nature, there is an increasing level of income and livelihood diversification especially to non-agricultural income generating activities (Oluwatayo, 2009). Diversification into non-farm income generating activities has been found to improve rural welfare (Babatunde and Qaim, 2010). The need for income diversification in rural areas include higher pay, lower risks, worsening terms of trade in agriculture, change in environmental resource base, climatic change, and natural disasters (Reardon *et al.*, 2006; Porter *et al.*, 2007; Akinwale, 2010). Several poverty studies had been done and the literature is awash with overwhelming facts on poverty but only a few of them relate poverty with diversification of income source among the farming household which this study aims at delving into with special reference to the rural farming households. The specific objectives of the study are to;

- i. describe the socioeconomic characteristics of the respondents, assess the poverty status of the respondents and
- ii. determine the effects of income diversification on poverty status of the respondents.

MATERIALS AND METHODS

Study Area

This study was carried out in Oyo state, Nigeria. The state is located in the rain forest vegetation belt of Nigeria between Longitudes 2° 32' W and 4° 08'E and latitudes 7° 34'N and 8° 35'N. It is bounded in the south by Ogun state and in the north by Kwara state, in the west by the Republic of Benin while in the east by Osun State. The State has 33 local government are and the total land area of 28,454km². The mean annual temperature and rainfall of the State are $\pm 27^{\circ}\text{C}$ and 1450mm respectively (NiMet, 2020). The edaphic characteristics revealed that the soil in the state is optimally weathered leading to retention of organic matter at the surface of the soil which sustain the surface feeder crops such as maize, cowpea, melon, millet and watermelon among others. Oyo state plays to many tribes for economic purposes such as Beninois, Malians, Fulani, Egede and Hausa among others.



Sampling Technique

A multistage sampling procedure was employed in the selection of the respondents used for the study. In the first stage was the purposive selection of Oyo State from Southwest Nigeria due to high concentration of active farming households. In the second stage was the random selection of four Local Government Areas (LGAs) from each of the four Agricultural Development Programme zones in the State, namely Egbeda LGA (Ibadan/Ibarapa zone), Surulere (Ogbomoso zone), Afijio LGA (Oyo Zone) and Iwajowa LGA (Saki zone). From the four LGAs was the random selection of the communities making a total of 12 communities forming the third sampling stage. From each of the 12 communities was the random selection of 15 respondents making a total of 180 respondents that were interviewed for the study.

Data Collection.

Data were collected using well-structured questionnaire and interview guide. Data collected included the socioeconomic and farm characteristics such as age, household size, marital status, monthly income, farm yield, cooperative membership and seasonal extension contacts to mention but a few.

Analytical Tools

Descriptive statistics, diversification index, Foster, Greer and Thorbecke (FGT) Poverty Index, Probit regression and Endogenous Switching Regression were used in analyzing the objectives stated for the study.

Descriptive Statistics

Descriptive statistics such as frequency counts, percentages and mean were used to describe the socio-economic characteristics of the respondents.

Diversification Index

Following Ellis and Freeman (2004), Inverse Herfindahl-Hirschman Diversity (IHHD) index was used to measure the level of income diversification for the off and on-farm income sources. This is given as follows:

$$IHHD_{ith} = 1 / \sum a_j^2$$

Where,

$IHHD_i$ = Inverse Herfindahl-Hirschman Diversity index of the i th farmer

a_j = represents the proportional contribution of each activity j to household i 's overall income

i th household is considered to be diversified in its income sources if $IHHD > 1$; if otherwise, it is equal to 1.

Level of household's income diversification was measured as:

$$LHID = \{n / N\} * 100$$

Where, LHID = level of household's income diversification

n = Number of farmers with IHHD index > 1

N = sample size

Classification of Rural Households into Poverty Groups

A relative poverty line was computed based on the Mean Per Capita Household Income (MPCHI) of the rural farming households. The Mean Per Capita Household Income (MPCHI) is obtained by dividing the total of all individual household per capita income by the number of households to be surveyed.

Mathematically,

$$\text{Mean Per Capita Household Income (MPCHI)} = \frac{\text{Total Per Capita Household Income}}{\text{Total Number of Households}}$$

$$\text{Poverty line } (z) = \frac{2}{3}(\text{MPCHI})$$

The analysis was based on the p-alpha () poverty measure proposed by Foster Greer and Thorbecke (1984) which is expressed as:

$$P_{\alpha}(y, z) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

z = the poverty line for the maize-based farmers ($2/3$ Mean Per Capita Household Income (MPCHI)),

y_i = Per capita income of the i th farmer,

q = number of respondents below the poverty line,

n = Sample size,

α = non-negative poverty aversion parameter and takes on the value 0, 1, 2 which represent the incidence, depth and severity of poverty respectively.

When: $\alpha = 0$ (Poverty headcount); $\alpha = 1$ (Poverty depth); $\alpha = 2$ (Poverty severity)

Probit Regression

The choice of probit model is specified as:

$$Y^*_{ji} = \sigma_j + \beta_{j1}Z_{1ij} + \beta_{j2}Z_{2ij} + \dots + \beta_{jk}Z_{kij} + \varepsilon_{ji}$$

Y^*_{ji} remains constant across alternatives

β_{jk} is a regression coefficient associated with the j th explanatory variable and the k th outcome for $j = 1, 2, 3, \dots, j-1$

ε_{ji} is a random error term reflecting intrinsically random choice. Where:

Y = Poverty status (non-poor = 1; Poor=0).

The independent variables include:

Z_1 = Age (years)

Z_2 = Household size (No.),

Z_3 = Primary occupation (agricultural = 1, 0 if otherwise),

Z_4 = Secondary occupation (non-agricultural=1, 0 if otherwise),

Z_5 = Farm size (ha),

Z_6 = Society Membership (members=1, 0 if otherwise),

Z_7 = Gender of household head (male = 1, 0 if otherwise),

Z_8 = Marital status (married = 1, 0 if otherwise),

Z_9 = Education level (in years)

Z_{10} = Monthly income (in Naira)

ε_{ji} = Error term.

Endogenous Switching Regression (ESR) Model

ESR model framework was used to analyse data. A two-stage estimation procedure is estimated simultaneously. The first stage involves estimating the selection to determine the factors influencing diversification as shown in equation below;

$$P^*_i = U_{iC} - U_{iN}$$

In the second stage, the impact of diversification on the outcome variables is specified for two regimes of diversifier and non-diversifier of the income on rural household as;

Regime 1 (diversifiers); $Y_{hA} = Z'_{hA}\beta + \mu_{hA}$ if $P_h = 1$,

Regime 0 (non-diversifiers); $Y_{hN} = Z'_{hN}\beta + \mu_{hN}$ if $P_h = 1$,

Where;

Y_{hA} and Y_{hN} are the outcome variables for diversifiers and non-diversifiers respectively;

Z = vector of Households' endowments and farm-level characteristics;

β = vector of parameter;



μ = error term.

The structure of the ESR model allows for an overlap of χ in equations and Z.

The expected values of the outcome Y on diversify and non-diversify can be expressed as in Equations

Regime 1 (high diversifiers): $E(Y_{hA} | P=1) = Z' X_{hA} - \sigma_{Ae} \lambda_A$

Regime 0 (low diversifiers): $E(Y_{hN} | P=1) = Z' X_{hN} - \sigma_{Ne} \lambda_N$

Thus, the independent (explanatory) variables that were used are as specified below;

X_1 = Age (in years)

X_2 = Sex (Male= 1, Otherwise= 0)

X_3 = Household size (No.)

X_4 = Farming experience (years)

X_5 = Marital status (Married = 1, Otherwise= 0)

X_6 = Association membership (Yes =1, No =0)

X_7 = Extension contacts (No.)

X_8 = Education level (in years)

X_9 = Farm size (in hectares)

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Table 1 showed the socioeconomic characteristics of the respondents. the results revealed that 68.9% of the respondents fell within the age bracket of above 60 years with a mean 62.5years, suggesting that they are getting close to economically inactiveness. It could be inferred from this result that this is caused by high rural-urban migration rate. Male respondents formed 64.4% of the farmers while their female counterparts are 35.6%. It could be inferred from this result that farm work requires more strength which can favourably be committed by the male farmers. Majority (86.7%) of the respondents were married indicating that the respondents valued cultured and tradition. The results also revealed that 35.6% of the respondents had no formal education which was the highest while farmers with the primary level of education were 7.2%. It could be inferred from this result that due to long time abandonment of rural communities leading to long distance between them and the school leading to discouragement. Result on the occupation of the respondents showed that the majority (79.4%) of the respondents were farmers. The result indicates that farming is prominent and flexible.

In addition, the results 27.8% of the respondents had less than 10 years of experience and average years of farming experience of 42years. This revealed that farmers in the area are experienced in the farming activities. The average monthly income of the respondents was N76, 438.45k while 42.4% of the farmers realized more than N80, 000 as monthly income in the previous cropping season. The results also showed that 41% of the respondents had household size of 7-10 members with an average of 6 members.

Family planning is not restricted to the urban and the literate alone, the rural and illiterate also plan family planning due to the counsel received from the maternity health centre. Furthermore, the results revealed that 66.1% of the respondents were members one cooperative societies or the other. It could be inferred from this result that farmers in the area realized the benefits derivable from being a member probably in the area of buying inputs at lower cost, advisory services and sale of output at optimal prices. Seasonal extension visits of the respondents revealed that 76.1% received extension visits in the previous season while 23.9% indicated no-visit. It could be inferred from this result that seasonal extension visit was not available to a few farmers.

Table1: Socioeconomic Characteristics of the Respondents

Variable	Frequency	Percent	Mean
Age (in years)			
≤20	15	8.3	62.5years
21-40	23	12.8	
41-60	18	10.0	
>60	124	68.9	
Gender			
Male	116	64.4	-
Female	64	35.6	
Marital Status			
Single	8	4.4	-
Married	156	86.7	
Divorced	9	5.0	
Separate	7	3.9	
Educational Level			
No Formal Education	64	35.6	-
Primary	13	7.2	
Secondary	54	30.0	
Tertiary	49	27.2	
Primary Occupation			
Farming	143	79.4	-
Artisan	12	6.7	
Public/Civil Service	15	8.3	
Trading	10	5.6	
Farming Experience (in years)			
≤10	50	27.8	42.4years
31-40	37	20.6	
41-50	40	22.2	
51-60	23	12.8	
>60	30	16.7	
Monthly Income (in Naira)			
≤40,000	16	8.9	N76,438.45k
40,001-60,000	41	22.8	
60,001-80,000	47	26.1	
>80,000	76	42.2	
Household Size (in No.)			
≤6	43	23.9	6 members
7-10	73	40.6	
11-15	30	16.7	
>15	34	18.8	
Cooperative Membership			
Yes	119	66.1	-
No	61	33.9	
Seasonal Extension Visit			
Yes	137	76.1	-
No	43	23.9	
Total	180	100.0	

Source: Field Survey, 2023.

Classification of Rural Farming Households Base on Income Diversification

Table 2 presents the diversification status of the farmers. The result revealed that 77.78% of the farming household in the study area had diversified income sources as shown by $IHHD < 1$. This implies that majority of the farmers in the study area had diversified their productive income base to on-farm activities such as livestock farming, crop farming, fishery, processing and hunting, and also off-farm activities such as trading, civil servant, artisans, self-employed, transporters and clergy to generate additional income for their sustainability. The mean income diversification index is 1.98. This implies that an average farmer in the study area is involved in other income generating activities as a means of diversification purposes. This result is consistent with the earlier studies of Oyewole *et al.*, (2015) that an average income diversification index was 2.02. Furthermore, the result also shows that 22.2% of the rural farming households did not diversify their income.

Table 2: Distribution of Respondents by Diversification Status

Diversification Status	Frequency	Percentage
Diversifier	140	77.8
Non- Diversifier	40	22.2
Total	180	100

Source: Field Survey, 2023.

Mean IDI= 1.98

Factors Influencing Level of Income Diversification among the Respondents

Table 3 presents the result on the determinant of the level of diversification among the respondents. The chi-square value (46.39) indicated that the estimated model taken jointly is significantly at a 1% level. The log-likelihood was 246.9623 indicating strong explanatory variables and the model is of good fit. Of eight variables included in the Tobit regression model, four variables were significant and signed according to *a priori expectation*; gender, marital status, education and farm size. The gender coefficient of (-0.0435) was significant at 1% level and negatively decreases the influence of the level of income diversification of the respondent in the study area. This indicates that a unit increase in the gender of the respondent would lead to a 4.4% decrease in the level of income diversification activities in the study area. This implies that female households diversify their income sources to a large extent than their male counterparts. Also, the coefficient of marital status was negative, (-0.0237) and significant at 5%. This implies that a unit increase in the marital status of the respondent would decrease the level of income diversification among the rural farming households by 2.4%. This might be a result of the overwhelming basic needs of the household such as food, clothing, and shelter.

The coefficient of the year of education 0.0011 was positive and significant at the 10% level. This implies that a unit increase in years of education would lead to a 1.2% increase in income diversification among households. This might be a result of the belief that the education of farming households enhances their exposure to modern farming technologies thereby improving their productivity. As a result of this, farmers would be better at diversifying their household income-generating activities. This is in consonant with studies of Adelekan and Omotayo, (2017); Daud *et al.* (2018) with studies highlighting the impact and role of education in income diversification. This is not surprising, as education facilitates access to a number of different economic activities, either as a formal requirement for wage-

earning jobs or because it helps set up and manage own small businesses. This assertion is further supported by the findings of Alawode and Adelere, (2021); Loison and Loison, (2016).

Table 3: Probit Estimate of Determinants of Level of Income Diversifications the Respondents

Variable	Coefficient	Standard Error	t-value	Prob. Val.
Age (in years)	0.0004	0.0004	1.10	0.273
Gender (Female)	-0.0435***	0.0072	-6.01	0.000
Marital Status (Married)	-0.0237**	0.0105	-2.25	0.026
Household Size (No.)	0.0029	0.0023	1.25	0.215
Education (in years)	0.0012*	0.0006	1.90	0.059
Extension Visit (No.)	0.0112	0.0075	1.50	0.136
Credit Obtained (in N)	-0.0117	0.0118	-0.99	0.324
Farm Size (in Hectares)	0.0108***	0.0017	6.35	0.000
Constant	0.9676*	0.5213	1.86	0.031
Number of Obs.	130			
LR Chi ² (8)	46.39			
Prob > Chi ²	0.000			
Pseudo R ²	-0.1037			
Log-likelihood	246.962			

Source: Field Survey, 2023 NB:***, **, * show significant level at 1%, 5% & 10%

Classification of the Respondents into Different Poverty Groups

Table 4 presents the state of poverty incidence, depth and severity and the poverty status of the respondents. Poverty line was determined to be ₦9,907.24 which is the line demarcating the poor from the non-poor. As a result, rural farming households with incomes below the poverty line were defined as poor (51.1%), if otherwise; they are categorized as non-poor (48.9%).

The poverty incidence or headcount (P_0) was 0.5165, indicating that 51.7 percent of farming households were genuinely and nominally poor. The disparity between rich and poor (P_1) was 0.1785 (poverty depth) suggesting that poor households were 17.8% below the poverty line and based on this requires far less than a quarter of ₦9,907.04 to jump out of poverty.

Similarly, poverty severity (P_2) was 0.0818 strongly suggesting that poor households were suffering from mild poverty. The result of most (51.11%) of the respondents shows that they were poor in respect to per capita income while 48.88% of the respondent were non-poor as regards their per capita income.

Table 4: Showing Estimate of Poverty Incidence, Depth, and Severity/Poverty Status

Index	Incidence (P_0)	Depth(P_1)	Severity(P_2)
Poverty Index	0.5165	0.1785	0.0818
Poverty Status	Frequency	Percentage	
Non-poor	88	48.9	
Poor	92	51.1	
Total	180	100.0	
Pov. line = ₦9,907.24			

Source: Field Survey, 2023



Determinants of Poverty among the Respondents

Table 5 presents the probit estimate of determinants of poverty among the respondents. Pseudo R-square (coefficient of determination) is 0.3012, suggesting that the model has a good fit for the data. This indicates that a 30.1% variation in poverty is explained by variations in the specified explanatory variables.

The negative link between the respondent's age and their poverty status was statistically significant ($P < 0.1$), showing that as the respondent's age grows, the likelihood of being poor decreases. This could be due to aged farmers' reduced willingness to take risks in diversifying their income from farming to non-farm and off-farm activities. The young productive and energetic farmers are more likely to take risks by diversifying their income for better livelihood. Marginally, a unit increase in respondents' age results in a 3.5% decrease in the probability of not being impoverished. This study backs up Awoniyi and Salman, (2012) and Sallawu *et al.*, (2016) findings that younger household heads earn more from wage employment than their older counterparts.

At a 5% significant level, gender had a substantial positive relationship with poverty status, indicating that being poor is more likely. This is because female-headed households are completely reliant on their male counterparts, as well as have a high fatality rate, which limits natural diversification. These findings, on the other hand, contradict the findings of Olubunmi *et al.*, (2017), who opined that the average male has more duties than his female colleagues. The marginal effect for gender was 0.2411, which means that as gender increases by one unit, the respondents' poverty status increases by 2.4 percent.

The result further revealed that marital status was significant at a 5% level and had a negative relationship with the poverty status of the respondents. This implies that the probability of the married reduces. This might be a result of the married household's involvement in income-generating activities as against other counterparts.

The results also showed that household size was positive and significant ($P < 0.01$) in determining the respondent's poverty status. This means that as the size of the household grows by one unit/one member, the likelihood of being poor rises by 1.5 percent. i.e., the larger the household size, the higher the respondents' poverty level. This is critical since larger households, particularly those with more dependents, would necessitate higher spending and, as a result, higher borrowing, increasing the likelihood of poverty. This is consistent with the findings of Asravor (2017); Oyewole *et al.* (2015) and Demissie and Legesse (2013), who found that having a large number of economically active members in the household improves a household's capacity and ability to participate in various income-earning activities such as on-farm and off-farm wage employment.

The extension visit number was negative and significant ($P < 0.01$) in determining the respondents' poverty status. This could be due to inaccessible road networks in the area which hampers extension visits. This could lead to decrease in product innovations that aid in diversifying economic activities among respondents and, as a result, decrease per capita income of the respondents.

Table 5: Probit Estimation of Determinants of Poverty among the Respondents

Variables	Coefficient	Std Errors	z	P> Z	Marginal Eff.
Age	-0.1293*	0.0205	-1.73	0.084	-0.0353
Gender(Female)	0.8393**	0.0859	2.80	0.005	0.2411
MarStatus(Married)	-0.9730**	0.1063	-2.40	0.016	-0.2554
Household Size	0.5584***	0.0366	4.16	0.000	0.1525
Education (in years)	-0.0150	0.0086	-0.48	0.633	-0.0041
Extension Visit No	-0.9230***	0.0737	-3.39	0.001	-0.2495
Access to Credit	0.2726	0.1368	0.54	0.591	0.0735
Farm Size	0.0135	0.0062	0.60	0.550	0.0037
Cooperative	-0.3361	0.0799	-1.15	0.250	-0.0918
Constant	0.0004	1.6483		0.655	

Number of Obs= 130

Wald Chi² (10) =33.56

Prob > Chi² = 0.0002

Pseudo R²=0.3012

LogLik. Ratio = 62.091

Source: Field Survey, 2023

NB:***, ** and * show Significant levels @t1%, 5% &10%

Factors Influencing Level of Income Diversification among the Respondents

Table 6 presents the probit estimate of the factors influencing income diversification in the study area. The chi-square value of 46.39 indicated that the estimated model taken jointly is significantly at a 1% level. The log-likelihood was 246.9623 indicating strong explanatory variables and the model is of good fit.

Out of eight variables included in the Tobit regression model, three variables were significant which are gender, marital status, and years of education. The gender coefficient of (-0.0435) was significant at 1% level and negatively decreases the influence of the level of income diversification of the respondent in the study area. This indicates that a unit increase in the gender of the respondent would lead to a 4.4% decrease in the level of income diversification activities in the study area. This implies that female households diversify their income sources to a large extent than their male counterparts. Also, the coefficient of marital status was negative, (-0.0237) and significant at 5%. This implies that a unit increase in the marital status of the respondent would decrease the level of income diversification among the rural farming households by 2.4%. This might be a result of the overwhelming basic needs of the household such as food, clothing, and shelter.

The coefficient of the year of education 0.0011 was positive and significant at the 10% level. This implies that a unit increase in years of education would lead to a 1.2% increase in income diversification among households. This might be a result of the belief that the education of farming households enhances their exposure to modern farming technologies thereby improving their productivity. As a result of this, farmers would be better at diversifying their household income-generating activities. This is in consonant with studies of Adelekan and Omotayo (2017); Daudet *al.* (2018) with studies highlighting the impact and role of education in income diversification. This is not surprising, as education facilitates access to a number of different economic activities, either as a formal requirement for wage-earning jobs or because it helps set up and manage own small businesses. This assertion is further supported by the findings of Alawode and Adelere (2021); Loison and Loison (2016).

Table 6: Factors Influencing Income Diversifications in the Study Area

LR Chi2 (8)	=46.39	Pseudo R ²	=-0.1037	
Prob > Chi2	=0.00	LL. hood	=246.962	
No. of Obs.	=130			
Variable	Coeff.	Std Error	t-value	p>/t/
Age (in yrs)	0.0004	0.0008	1.10	0.273
Gender (Female)	-0.0435***	0.0072	-6.01	0.000
Marital Status (Married)	-0.0237**	0.0106	-2.25	0.026
Household Size (No.)	0.0029	0.0023	1.25	0.215
Education (in yrs)	0.0012*	0.0006	1.90	0.059
Extension Visit (No.)	-0.0112	0.0074	-1.50	0.136
Credit (in Naira)	-0.0117	0.0118	-0.99	0.324
Farm Size (in Hectares)	0.0008	0.0007	0.56	0.574
Constant	0.9676			
No. of Obs.	130			
LR Chi ² (8)	46.39			
Prob > Chi ²	0.000			
Pseudo R ²	-0.1037			
Log-likelihood	246.962			

Source: Field Survey, 2023

NB: ***, **, * show significant level at 1%, 5% & 10%

Determination of Effect of Income Diversification on Poverty Status

The result shows that positive determinants of high diversification were: age and farm size, while negative determinants were: gender, marital status, occupation, primary education, secondary education, and tertiary education. Also, the positive determinants of low diversification are age, primary education, secondary education, and tertiary education while negative determinants are gender, marital status, occupation, and farm size. This implies that variables that are positive increases diversification while those that are negative decreases diversification. Statistically speaking, the result further indicates that the negative and significant determinants of diversification are: gender, occupation, primary education, and tertiary education. The coefficient of the gender variable for both high diversifier and low diversifier is negative and significant at both 1% and 5% levels respectively. This implies that a unit increase in gender will decrease diversification by 8.6% and 1.6% respectively. The finding suggests that compared with female household heads, the males are less likely to diversify their income in the study area. This contradicts the findings of Leng *et al.*, (2020); Demissie, (2013) who opined that male household heads were more able to derive income from multiple self-employment and wage employment to escape poverty. The negative and significant coefficient of the occupation variable at 10% for low diversifier implies that rural farming households having employment will less likely have higher income diversification by 2.3%. Furthermore, the coefficient of primary education and tertiary education for high diversifiers is negative (-) and statistically significant at 5% while it is positive but insignificant for low diversifiers. This indicates that a unit increase in primary and tertiary education of the respondents will lead to a 1.1% and 1.2% decrease in income diversification of the respondents respectively. This implies that less-educated households in the study area are less-likely to diversify income than their high-educated counterparts.

Table 7: Endogenous Switching Regression Estimate of Effect of Income Diversification on Poverty Status of the Respondents

Variables	Selection Coefficient	P-Value	Poor Co-eff.	Poor P-value	Non-Poor Coefficient	Non-Poor P-Val
Age	-0.2221**	0.008	0.0038	0.827	0.0096	0.781
Gender	-0.7210***	0.003	-0.8649***	0.001	-1.6295**	0.008
Marital Status	0.6616*	0.074	-0.3042	0.519	-1.3068	0.279
Occupation	0.3882	0.167	-0.4293	0.321	-2.2942*	0.050
Prim. Educ.			-1.0640**	0.043	0.8487	0.310
Sec. Educ.			-0.3590	0.376	0.8271	0.286
Tert. Educ.			-1.2238**	0.018	0.4397	0.601
Coop. Mem.	0.1841	0.380				
Credit Access	-0.5436	0.161				
Extension Visit	0.2445	0.364				
Farm Size			0.0105	0.666	-0.6882	0.130
Constant	5.0586	0.008	0.6949	0.623	2.5849	0.318
/athrho1	1.3306	1.345				
/athrho0	0.2005	0.846				
rho_1	0.8694	0.328				
rho_0	0.1979	0.813				
No of Obs.	175					
Log- Likelihood	-186.804					
Wald Chi2 (8)	28.31					
Prob > Chi2	0.0004					
LR test	1.06					

Source: Field Survey, 2023 **NB:*****, ** and * show Significant levels @ 1%, 5% & 10%

Table 8 shows the treatment effects of income diversification on the poverty status of rural farming households. Average treatment effect on the treated (ATT), which is the mean effect of the treatment on the poverty status of the rural farming household who highly diversified their income, is 0.3622, positive and statistically significant at a 1% level. This clearly demonstrates that income diversification is one of the means by which the poverty status of the respondent can be reduced, thus improving the well-being of rural farming households in the study area.

Table 8: Summarize tt if (div012 = = 1 i.e High Diversifier)

Variable	Obs.	Mean	Std Dev.	Min.	Max.
Tt	115	0.3622***	0.2259	0.2179	0.8087

Source: Field Survey, 2023.

Hypothesis Testing

The hypothesis relating poverty and income diversification using t-test statistic is presented in Table 8. The t-values for the poverty and the diversification statuses of the

respondents were 11.307 and 15.474 with the mean difference of 0.4166 and 0.5722 were found to be significant 1%. This indicates that there is a significant relationship between poverty and diversification. The result suggests that the respondents who diversified their source of income were found to be less poverty ridden than their counterparts who were otherwise.

Table 9: Hypothesis Testing the Relationship between Poverty and Diversification among Farmers

Variable	T	Df	Sig. (2-tailed)	Mean Diff.
Poverty	11.307	179	0.000	0.4166
Diversification	15.474	179	0.000	0.5722

Source: Field Survey, 2023.

NB: *** indicates significant level @ 1%.

CONCLUSION AND RECOMMENDATIONS

It could be concluded from the study that diversification of income by the rural farming households gainfully increased the income of the members and reduced the household poverty. Based on the findings in the study, it can be recommended that:

- (i) There is a need for the stakeholders in the agricultural industries to create the awareness for the farming households to engage in other income generating economic activities most especially during the off-season that farm activities are nearly zero.
- (ii) Farming households should be enlightened that age is not a barrier to income diversification as the decision to diversify is not age-discriminatory.
- (iii) More awareness should further be created among the farmers that the off-season period could be utilized for better income generation opportunities which will augment their income and promote household welfare and creates more capital to keep farming more financially buoyant.

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